NEWSLINE

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Detector to seek elusive neutrinos

By Anne M. Stark
NEWSLINE STAFF WRITER

Livermore scientists are working to solve a 50-year-old question: Can neutrinos — a particle that is relatively massless, has no electric charge yet is fundamental to the make-up of the universe — transform from one type to another?

Scientists are using two giant detectors, one at Fermi Lab and another in a historic iron mine in northern Minnesota, to work on the answer.

Excavations of the cavern and of the MINOS detector in Soudan, Minn. took four years. The University of Minnosota Foundation commissioned a mural for the MINOS cavern, painted onto the rock wall, 59 feet wide by 25 feet high.

As part of the international team working on the Main Injector Neutrino Oscillation Search (MINOS) project, Laboratory researchers will use the detectors to explore the mysterious nature and properties of neutrinos. Namely, they will seek to discover how neutrinos "change flavors."

Neutrinos come in three "flavors:" electron, muon and tau. Each is related to a charged particle, which gives the corresponding neutrino its name. Neutrinos are extremely difficult to detect because they rarely interact with anything. Though they

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JGI introduces new system for managing genome data of microbial sequencing efforts

By David Gilbert
NEWSLINE STAFF WRITER

To more effectively manage the flood of data emanating from countless microbial genome sequencing projects advanced by centers around the globe, the Joint Genome Institute (JGI) has introduced a new Integrated Microbial Genomes (IMG) data management system.

As the number of microbial genomes sequenced continues to rise, the genome analysis process becomes the rate-limiting step, JGI Director Eddy Rubin said. By integrating publicly available microbial genome sequences with JGI sequences, the IMG system offers a powerful data management platform that supports timely analysis of genomes from a comparative functional and evolutionary perspective.

The JGI is currently producing nearly one-quarter of the number of microbial genome projects worldwide, more than any other single institution. The IMG system, the fruit of a collaboration between the JGI and Lawrence Berkeley National Laboratory's Biological Data Management and Technology Center (BDMTC), currently features

See **JGI,** *page 4*

Nevada Atomic Testing Museum opens its doors to the public, offering journey through Cold War

In a stirring tribute to many of those whose achievements and sacrifices contributed to winning the Cold War, the nation's Atomic Testing Museum officially opened its doors to the public on Feb. 20.

At the dedication, DOE and NNSA officials and Lab employees joined Troy Wade, president of the Nevada Test Site National Historical Foundation. Among the guests were Linton Brooks, administrator of the National Nuclear Security Administration; Jerry Paul, principal deputy administrator; Dale Klein, assistant to the Secretary of Defense for Nuclear, Chemical and Biological Defense Programs; Don Kerr, deputy for Science at the Central Intelligence Agency, their wives and U. S. Rep. Shelley Berkley. Executive Officer Ron Cochran, Ann Heywood, Bill Bookless and Rick Higgs, with a number of former Lab employees, also attended the ceremony.

Sen. Harry Reid, U.S. Senate minority leader, headed the extensive list of distinguished guests who participated in the three-day dedication activ-

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A day dedicated to engineering the future

By Linda Lucchetti
NEWSLINE STAFF WRITER

About 500 middle school students and teachers from the Tri-Valley and Oakland participated in "Engineers Day" held at the Lab Feb. 25 in the Bldg. 123 auditorium and the area near the West Cafeteria. The annual event sponsored by the Engineering Directorate coincides with "National Engineers Day" to heighten awareness of careers in engineering.

ANNE M. STARK/NEWSLINE

Students at Engineers Day examine some gooey slime they made during a "Fun with Science" experiment. About 500 sixth- and seventh-graders participated in the half-day program that included a tent with hands-on activities and displays.

The keynote address, "Destination Space Station," was given by Jeff Wisoff, Lab engineer and former

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LAB COMMUNITY NEWS

Weekly Calendar

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Friday 4

Today is the first deadline for submitting **FY06 proposals in the Strategic Initiative (SI)** category of the Laboratory Directed Research and Development (LDRD) Program. Preproposals for new SI projects and full proposals for continuing SI projects are due to Nancy Campos (campos1@ llnl.gov or 2-9805) in the LDRD Program office by close of business. For further information about SI proposals, contact Campos or go to the LDRD Web page at https://lsto.llnl.gov/Proposals/ProposalHome.pl The SI competition is open to all LLNL scientists, engineers and technical staff.

Thursday 10

The Employee and Organization Development Division will hold an **education assistance briefing** today from noon to 1 p.m. in Bldg. 571, room 1301/1335 for employees interested in pursuing an undergraduate/graduate degree or certificate. The briefing provides an opportunity for employees to learn about the Lab's tuition assistance program and talk one-on-one with EODD staff. If you plan to attend, call EODD, 4-5479. To register, contact Joanne Olson at olson34@llnl.gov.

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A representative from the **Social Security Administration** will be at the Lab today from noon – 1 p.m. in the Bldg. 361 auditorium to discuss the many benefits that are available to those covered by Social Security. This one-hour presentation will cover such things as Social Security and retirement, Social Security and disability, survivor benefits, Medicare and much more. This presentation will provide participants with the opportunity to ask questions of experts who are familiar with the complexities surrounding this very important benefit. For additional information, contact the Benefits Office, 2-9957.

Up & Coming

March is **Women's History Month.** The Lab Women's Association (LLLWA) is offering the following activities:

March 14-18: The Women's Association and B Division will hold a used book sale from 11:30 a.m. to 1 p.m. in Bldg. 132N, room 1200, with deals on books, CDs, videos and puzzles. Prices range from 25 cents for kids books to $3 for CDs and videos.

March 15: Dolores Huerta, a respected labor movement leader and women rights advocate, will serve as guest speaker from noon to 1 p.m. in the Bldg. 123 auditorium. Huerta will talk about her experiences working with Cesar Chavez and founding the United Farm Workers Association; the women's impact on the protests and marches; the obstacles and stereotypes she overcame; and the current state of migrant farming rights and living conditions. Huerta will be honored this month with a "Women of the Year Award"

Hitomi named to state science council

Stan Hitomi

Stan Hitomi, executive director of the Edward Teller Education Center, has been selected to serve as chair of the newly formed California Teacher Advisory Council (CalTAC), an effort led by the California Council on Science and Technology and the Center for the Future of Teaching and Learning to strengthen mathematics and science instruction in California.

Hitomi is a former science teacher at Monte Vista High School in Danville.

Council members will inform and guide the development of policies and practices to strengthen the quality of mathematics, science and technical education in California and provide guidance in the analysis of California's K-14 teacher development system.

CalTAC's first effort will be a new project to examine the state's mathematics and science workforce. This analysis will target the gap between the supply and demand for science and math teachers throughout the state, determine where the teacher development system is failing likely teacher candidates and identify strategies to boost production of math and science teachers.

CalTAC is the first state council to join the National Academies' effort to establish state-level teacher advisory councils throughout the United States. Initial funding for the project has been provided by a grant from the Stuart Foundation. Additional information is available at www.cftl.org or http://www.ccst.us.

Deadline looming for summer's COSMOS

March 15 is the deadline for high school students to apply to COSMOS — the California State Summer School for Mathematics and Science. COSMOS is a month-long residential program for students who are completing grades 8-12, demonstrate high achievement in science and mathematics and are motivated to explore complex topics in depth.

Students may apply to one of the four COSMOS campuses or sites: Davis, Irvine, San Diego, and Santa Cruz. Each site offers different theme-based course clusters that reflect the unique resources and specialties of the campus. Students learn cutting edge science, engineering, mathematics and biomedical sciences from distinguished faculty and select high school teachers.

Admission is based upon standardized test scores, grade point average, achievement in science projects and/or competitions, teacher recommendations, motivation and community service. The fee was reduced for this coming summer to $1,273. Tuition waivers are provided if financial need is documented. For more information about COSMOS go to www.ucop.edu/cosmos.

Science on Saturday explores origins of the universe

Learn about some of the most recent discoveries in astronomy when LLNL scientist Wil van Breugel, and Granada High School teacher Tom Shefler present "From the Big Bang to California: Observations of the Universe," the final lecture in this year's "Science on Saturday" series on Saturday (March 5) at 9:30 a.m. at the Amador Theater in Pleasanton.

The lecture will explore the origins of the universe; the formation of galaxies; black holes; stars and planets; the importance of the interstellar medium; and recent NASA explorations in our own solar system. Some of this research is occurring at LLNL, where scientists are studying the important role that super-massive black holes play in the formation of galaxies.

The free lecture is geared for students in middle through high school and is aligned with California Science Standards.

There is no pre-registration, and seating is on a first come, first-served basis. Directions and maps are available at http://education.llnl.gov/sos/.

"Science on Saturday" is presented by LLNL's Science and Technology Education Program, and Sigma Xi, Livermore Chapter. For additional information, contact Richard Farnsworth at 2-5059.

CORRECTION

The caption for the subcontractor award photo that ran on page 2 of *Newsline* Feb. 25 incorrectly matched the Lab employee names with the faces. The correct order is Ed Cunniffe of Procurement on the left and Ed Helkenn of Plant Engineering on the right.

Plant Engineering and the Procurement Department have presented a new award for subcontractors — the Subcontractor of the Year Award.

This is the first year the awards have been presented. Two subcontractors recently received the award from Helkenn, head of Plant Engineering, and Cunniffe, head of the Procurement Dept. during a construction subcontractor partnering workshop.

The 2004 Subcontractor of the Year awards went to Bockmon & Woody Electric Inc. and B&B Grading and Paving, Inc. (see page 2 of the Feb. 25, 2005 *Newsline*). These awards were based on the subcontractors' 2004 performance in areas including: adherence to safety requirements; quality of workmanship; cooperation with Lab personnel; schedule adherence; and responsiveness.

Newsline

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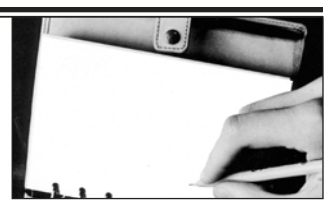
News of note



MINOS

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can easily pass through a planet, solid walls and even a human hand, they rarely leave a trace of their existence.

"The probability of a neutrino interacting with anything is very small," said LLNL's Peter Barnes, who along with Doug Wright and Ed Hartouni, is working on the MINOS experiment. "If you want to detect any neutrinos, you need something big."

Barnes, Wright and Hartouni are hoping that something big is a 6,000-ton detector lying deep in the Soudan, Minn. mine. The neutrinos will be generated along the underground beam line at Fermi Lab, will pass through the near detector at Fermi, and will travel through the Earth to the detector in Minnesota. Neutrinos are more easily detected when they are generated at a high energy (such as those at Fermi Lab).

The MINOS scientists chose the distance to the far detector to maximize the oscillation probability, which gives them the best opportunity to directly study the neutrino "flavor change."

Fusion in the sun results in electron neutrinos and scientists have predicted that if they can measure the electron neutrinos coming from the sun, they can measure the core of the sun. However, early experiments showed that less than half the expected neutrinos were observed on Earth. The idea that the missing electron neutrinos may have transformed into another type or "flavor" came alive.

This conclusion indicates that neutrinos do have some mass, small as it may be, in order for them to oscillate. So a portion of the electron neutrinos emitted from the sun could have changed flavors to muon or tau neutrinos before reaching Earth, thus solving the missing neutrino problem.

But it still doesn't explain how or why this occurs, Barnes said. "Our goal is to understand the flavor oscillation properties of neutrinos," he said.

Studying the elusive neutrino will help scientists better understand particle physics, specifically how particles acquire mass, as well as the role of neutrinos in the formation of the universe and their relationship to dark matter.

Livermore's portion of the project is funded by Laboratory Directed Research and Development and Physical Data Research Program dollars. The MINOS effort as a whole is funded by the Department of Energy's Office of Science, High Energy Physics division.

MINOS was formally dedicated in a ceremony today (March 4) at the Fermi National Accelerator Lab.

ENGINEERING DAY

Continued from page 1

NASA astronaut who has logged three space walks and more than 42 days in space on four Space Shuttle missions. The audience viewed a video of Wisoff's space shuttle voyage, which included a space walk. In speaking about his professional accomplishments, Wisoff encouraged the students, telling them that "if you want something, apply yourself."

During the event, students explored a variety of hands-on demonstrations and had "Fun with Science," rode an energy bike, viewed graphics simulations, made DNA jewelry, operated a robotic arm, looked inside a computer and interviewed "mystery engineers."

Two new contests were introduced this year that tested students' ingenuity. The "egg dummy vehicle crash test" was very popular with teams of classmates who built small vehicles that could carry an egg to be hurtled down a steep ramp and into a wall, without breaking. Another competition, "how high is that?" challenged teams to build a tool with materials given to them, that would measure the height of several items.

Classified ads to return next week to *Newsline*

Due to space limitations, *Newsline's* classified ads will return next week. This week's new advertisements are available on the Web: https://www-ais.llnl.gov/ newsline/ ads/. To appear in *Newsline*, ads submitted between Feb. 3 and March 1 will need to be resubmitted.

Technical Meeting Calendar

Friday 4

INSTITUTE FOR GEOPHYSICS AND PLANETARY PHYSICS
"Ultraluminous Infrared Galaxies as seen by the IRS on Spitzer," by Lee Armus, California Institute of Technology, Spitzer Science Center. Noon, Bldg. 319, room 205. Property protection area. Foreign national temporary building access procedures apply. Contact: Wil van Breugel, 2-7195, or Lisa Lopez, 3-0250.

Monday 7

CHEMICAL BIOLOGY & NUCLEAR SCIENCE/ BIOSECURITY & NANOSCIENCES LAB
"Salt and Water," by Sutapa Ghosal, post-doctoral researcher, UC Berkeley. 2 p.m., Bldg. 151, room 1209, Stevenson Room. Foreign nationals may attend if approved plan is on file which includes B151. Contacts: Katie Thomas, 2-7903 or Chris Orme, 3-9509.

Tuesday 8

INSTITUTE FOR LASER SCIENCE & APPLICATIONS
"Radiative Effect on Particle Acceleration via Relativistic Electromagnetic Expansion," by Koichi Noguchi, Rice University. 1 p.m., Bldg. 319, room 205. Property protection area. Foreign national temporary building access procedures apply. Contact: Don Correll, 2-6784, or Kim Morris, 3-8892.

NEW TECHNOLOGIES ENGINEERING DIVISION
"Microscale Thermal Engineering," by Kenneth Goodson, Stanford University. 2 p.m., Bldg. 235, room 1090, Gold Room. Property protection area. Foreign national temporary building access procedures apply. Contact: Wayne Miller, 4-4472.

Wednesday 9

UNIVERSITY RELATIONS PROGRAM
"New Light on Earth and Planetary Interiors: from the Earth's Core to Hot Dense H2O," by Jung-Fu Lin, Carnegie Institution of Washington. 10 a.m., Bldg. 319, room 205. This seminar will be presented as part of the two-day interview process for the Lawrence Fellowship. Property protection area. Foreign national temporary building access procedures apply. Contact: Cheryl Kuks, 3-5643.

ASC PROGRAM
"A Scalable Optically Switched Interconnect for PetaFLOP Class Computing Systems," by Henry Brandt, IBM, Richard Grzybowski and Roe Hemenway, Corning, 10 a.m., Bldg. 451, White Room. Property protection area. Foreign national temporary building access procedures apply. Contact: Dick Watson, watson9@llnl.gov.

N DIVISION
"Recent Developments in Neutrino Science: A Whole Lot About Almost Nothing," by Rick Norman, 1:30 pm, Bldg. 211, room 227. Property protection area. Foreign national temporary building access procedures apply. Contact: Pat Smith, 2-8210.

INSTITUTE FOR SCIENTIFIC COMPUTING RESEARCH
"A Hybrid Hardware/Software Approach to Efficiently Determine Cache Coherence Bottlenecks on the Itanium-2," by Frank Mueller, North Carolina State University, 3 p.m., Bldg. 551W, room 1400. For more information, see URL (http://www.llnl.gov/casc/calendar.shtml) Property protection area. Foreign national temporary building access procedures apply. Contact: Bronis de Supinski, 2-1062, or Erica Dannenberg 3-2167.

Thursday 10

INSTITUTE FOR SCIENTIFIC COMPUTING RESEARCH
"HiFi — An Architecture for Large-Scale Sensor Data Processing," by Michael J. Franklin, University of California at Berkeley, 11 a.m., Bldg. 451, room 1025. For more information, see URL http://www.llnl.gov/ casc/calendar.shtml). Property protection area. Foreign national temporary building access procedures apply. Contact: Ghaleb Abdulla, 3-5947, or Erica Dannenberg, 3-2167.

Friday 11

INSTITUTE FOR GEOPHYSICS & PLANETARY PHYSICS
"The Ultraviolet Field, the Neutral Gas, and Star Formation in Galaxies," by David Hollenbach, NASA Ames Research Center. Noon, Bldg. 319, room 205. Property protection area. Foreign national temporary building access procedures apply. Contact: Wil van Breugel, 2-7195, or Lisa Lopez, 3-0250.

The deadline for the next Technical Meeting Calendar is noon, Wednesday.

MUSEUM

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ities.

"The test site played a critical role in the Cold War," Cochran said. "The long-standing partnership of the Laboratory with the NTS is an essential element of the nation's history, which is now recognized at the Atomic Testing Museum. Our continuing partnership with NTS will be essential as we move into the next stages of stockpile stewardship and our broader national security programs. The people of Nevada played a very important role in ensuring the security of our country and their contributions, as well as their sacrifices, have earned our continuing gratitude."

The multi-million dollar Atomic Testing Museum examines the history of nuclear weapons testing in the United States, focusing primarily on the role of the Nevada Test Site, which sits 65 miles from Las Vegas. NTS operated as the country's primary nuclear weapons testing facility from 1951 until 1992, with above-ground explosions going off regularly in the early days well within sight of Las Vegas residents and tourists.

The Nevada Test Site Historical Foundation (NTSHF) was founded in 1998 to preserve the NTS legacy. In 2001, the Smithsonian Institution granted affiliate status to the historical foundation that allows the new museum exhibit center to receive collections on long-term loan, to exhibit traveling shows and to participate in a variety of Smithsonian programs. The historical foundation's mission is to preserve and foster public accessibility to the history associated with the NTS and the nation's nuclear weapons testing program.

Laboratory Executive Officer Ron Cochran and Troy Wade, president of the Nevada Test Site Historical Foundation, stand in front of the original Nevada Test Site guard station at the opening of the Atomic Testing Museum.

The 8,000-square-foot permanent exhibit hall includes artifacts on loan from personal collections, the Smithsonian Institution, Livermore Laboratory and pieces of the Berlin wall and the World Trade Center. The exhibits include touch screens, motion-sensitive plasma TV presentations and audio interviews with former workers from the test site.

In addition to the permanent exhibits, the museum also has a 2,000-square-foot changing exhibit hall, a museum store and a History Walk. Adjacent to the museum are the Nuclear Testing Archives, a collection of more than 310,000 documents related to radioactive fallout from U.S. testing of nuclear devices.

From the atmospheric testing of the 1950s to the underground testing of the 1960s and 1970s, visitors can walk through a giant circular piece of steel reinforcement that was actually used in one of the underground tunnels at the NTS.

The museum goes on to delve into work performed at NTS during the 1980s through 1992 when a testing moratorium stopped nuclear testing at the site.

The museum sits at 755 East Flamingo Road, Las Vegas. For more information about the museum, go to www.atomictestingmuseum.org.

A future *Newsline* story will feature interviews with former test site workers about their experiences at NTS.

JGI

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more than 200 organisms, with an additional 200 already in the queue for 2005. The value of genome analysis depends on the quality of the data and increases with the number of genomes available for comparative analysis, said Victor Markowitz, head of BDMTC, who led the IMG development effort.

"IMG is so fundamental, that the power of making clean data available to our collaborators and the scientific community will be revolutionary," said Nikos Kyrpides, of JGI's Microbial Genome Analysis Program (MGAP), who provided scientific leadership and overall coordination for the IMG project. MGAP manages the IMG's data content and curation and helped develop the system, with additional support provided by JGI's Microbial Ecology and Genome Data System groups.

Gary Andersen, the leader of LBNL's Earth Sciences Division Molecular Microbial Ecology group uses IMG for a project sponsored by the DOE Genomics GTL Program, exploring the potential of a particular microbe, Caulobacter crescentus, for heavy-metal remediation in wastewater.

"The IMG system is very useful in identifying potential functions for genes that we find unregulated in Caulobacter crescentus strains exposed to heavy metals. Examining the neighborhood around a gene of unknown function in multiple species selected from the organism browser may yield clues of what its role might be in your particular species," Andersen said. "The interface is quite intuitive, which is a benefit for someone like me who doesn't like to read manuals."

The IMG team will hit the road during March and April to familiarize the user community with the IMG system. A full schedule of the presentations is available at: http://img.jgi.doe.gov/v1.0/news/presentations.html.

All fired up

BOB HIRSCHFELD/NEWSLINE

More than 580 middle and high school girls from throughout the Tri-Valley attended the "Expanding Your Horizons" (EYH) Conference sponsored by Livermore and Sandia Labs and held in San Ramon on Saturday, Feb 26. Hanna Gil, of Danville's Charlotte Wood Middle School (with axe) and Taylor Ryan of Pleasanton's Harvest Park Middle School (in yellow) modeled turnout coats from the LLNL Fire Department for other girls attending the conference.

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